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DIRECÇÃO REGIONAL DO CENTRO
DO MINISTÉRIO DA ECONOMIA

AUTORIZO A INSTALAÇÃO

Processo N.º 10881/C

COIMBRA, Em 2011-02-15

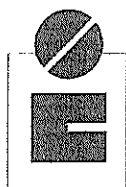
P.º O Director Regional


Helena Rodrigues
Directora de Serviços



PROJECTO DE INSTALAÇÃO DE GERADOR DE VAPOR

RSP N.º 10881/C



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INSTITUTO DE CONTROLO INDUSTRIAL DO CENTRO LDA



MEMÓRIA DESCRITIVA

A presente memória descritiva e justificativa, refere-se ao projecto de instalação de um gerador de vapor, a levar a efeito na firma SUMOL+COMPAL MARCAS, S.A., contribuinte n.º 505042037, localizada na Zona Industrial da Formiga, 3100 – 517 Pombal, freguesia da Pombal, concelho da Pombal, distrito de Leira, com o telefone nº 236210800.

O gerador de vapor que se pretende instalar tem o número de registo 10881/C.

1 – CARACTERÍSTICAS DO GERADOR DE VAPOR

O equipamento sob pressão que se pretende instalar é um gerador de vapor usado, com as seguintes características:

Fabricante: MORISA
N.º de Fabrico: 623
Ano de fabrico: 1988
Pressão máxima admissível (PS): 10 bar
Capacidade total (V): 16,73 m³
Superfície de Aquecimento: 200 m²
Produção máxima de vapor: 8400 kg/h
Potência: 5860,4 kW
Fluido(s) a conter: Água / Vapor
Combustível: Gás Natural/Fuelóleo



- Sistema de alimentação de água;
- Sistema de alimentação de combustível;
- Quadro eléctrico;
- Chaminé.

A caldeira propriamente dita compreende um corpo cilíndrico horizontal, que contém o volume de água, de tripla passagem de gases, com tubo de fogo, tubos de fumo e com câmara de inversão dos gases de fumo completamente banhada por água e isolada com lã mineral.

No gerador de vapor encontram-se instalados diversos equipamentos como sejam:

- Manómetro devidamente verificado, com válvulas de seccionamento com pater para possibilitar a instalação de um manómetro padrão.
- Válvula de saída de vapor.
- Dupla válvula de retenção na alimentação de água ao gerador de vapor.
- Válvula de descarga de fundo. A descarga está ligada ao exterior através de tubo de aço sem costura.
- Duas válvulas de segurança de mola DN 65x100, PN16, calibradas para a pressão de disparo de 10 bar, com caudal unitário de descarga de 8740 kg/h. A descarga está ligada ao exterior através de tubo de aço sem costura.
- Indicadores de nível de água.
- Controlador automático de nível, com contactos que permitem ligar e desligar a bomba de água e desligar o queimador em caso do nível mínimo de segurança ser atingido.
- Eléctrodos para detecção dos níveis máximo/mínimo, desligando, em caso de nível máximo, as bombas de alimentação de água ao gerador e, em caso de nível mínimo, desligando o sistema de queima.
- Pressóstato de segurança de serviço que desliga todo o sistema de queima quando a pressão do gerador atinge a pressão de serviço máxima (abaixo do timbre).

- Pressóstato de segurança máximo que desliga o sistema de queima e dá alarme por excesso de pressão do gerador de vapor.

O gerador de vapor tem instalado um programador que comanda o sistema de queima e indica as avarias do queimador.

O sistema de queima é constituído por um queimador, próprio para queima de gás natural, que em condições normais de funcionamento produz uma combustão limpa, cujos parâmetros apresentam valores dentro dos limites legais.

O gerador de vapor dispõe de aparelhagem de segurança, controlo e protecção, tanto por segurança por falta de água, como segurança contra sobre tensões.

O quadro eléctrico é composto por toda a aparelhagem de comando e protecção.

A água de alimentação da caldeira, vinda de um depósito, após passar por filtros, válvulas de seccionamento e de retenção, é introduzida na caldeira por acção de um grupo electrobomba.

O funcionamento do grupo electrobomba é automático e comandado pelo controlador de nível instalado no quadro de comando.

A chaminé metálica existente (em chapa de aço carbono), com uma altura de cerca de 15 metros, está assente sobre maciço de betão próprio, possuindo duas tomas para recolha de amostras e plataforma e escada de acesso às tomas de amostras, instaladas de acordo com a NP 2167 e segundo o Decreto Lei nº 78/2004, de 3 de Dezembro de 2004, não existindo num raio de 50 metros, qualquer habitação susceptível de ser afectada pelos gases emitidos pela mesma. A conduta de exaustão de gases da caldeira está ligada à chaminé metálica existente.

4 – SISTEMA DE QUEIMA

O sistema de queima é constituído por um queimador automático, monobloco, próprio para a queima de gás natural, de pulverização por pressão com acendimento directo por faísca eléctrica, equipado com sonda de ionização para detecção de chama, que possui o ventilador do ar de

combustão incorporado no próprio equipamento. O queimador instalado foi fabricado e ensaiado de acordo com os padrões de segurança europeus.

As principais características do queimador instalado são as seguintes:

Marca do queimador SAACKE
 Modelo SKVJG 50
 Combustível: Gás natural/Fuelóleo
 Sistema de controlo Modulante
 Construção Monobloco
 Sistema de arranque: Gás / Eléctrico
 Ventilador Incluído
 Rampa de gás (completa) Incluído
 Potência (min./máx.): 590 / 6100 kW

4.1 – Principais equipamentos de controlo e de segurança

De acordo com o esquema de princípio da linha de alimentação de gás, os principais componentes de controlo e de segurança são os seguintes:

- Válvula de seccionamento manual, no início da rampa de gás;
- Filtro;
- Pressóstato de mínima;
- Manómetros com válvulas de seccionamento;
- Válvula electromagnética dupla;
- Pressóstato de máxima;
- Regulador de pressão de gás;
- Válvula para teste de gás.

5 – LOCAL E CONDIÇÕES DE INSTALAÇÃO

O gerador de vapor será instalado na “Casa das Caldeiras” já existente, ao lado de outra caldeira. A casa das caldeiras, local especialmente destinado a este tipo de equipamentos, é suficientemente ampla, com iluminação e arejamento adequado, possuindo várias portas para o exterior, em sentidos opostos disposta a 90° entre elas, para permitir saídas rápidas e fáceis, em caso de emergência.

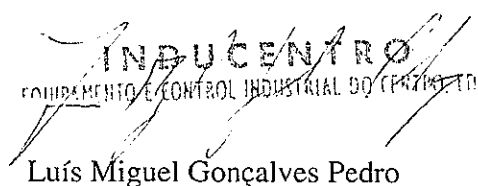
A renovação de ar na casa das caldeiras é feita por ventilação é natural, através das portas, janelas e grelhas existentes.

Existem vários extintores de pó químico dispersos pela central térmica, assim como sinalética adequada, nomeadamente avisos de proibição de fumar e proibição de foguear. Junto ao gerador de vapor existe um balde metálico cheio de areia. Junto à entrada da casa da caldeira existe ainda um dispositivo de corte geral eléctrico.

A casa de caldeiras situa-se ao nível do solo, dentro do perímetro das instalações, a uma distância de mais de 10 metros de casas de habitação ou da via pública. O gerador de vapor não se encontra instalado dentro, por cima ou por baixo de áreas habitualmente frequentadas por pessoas, nomeadamente áreas residenciais e áreas públicas.

O Técnico

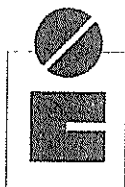
Taveiro, 29 de Novembro de 2010



INDUCENTRO
EQUIPAMENTOS E CONTROL INDUSTRIAL DO CENTRO, LDA

Luís Miguel Gonçalves Pedro

Engenheiro Técnico Mecânico, com o n.º 2178 de inscrição
na Associação Nacional de Engenheiros Técnicos.



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EQUIPAMENTO E CONTROL INDUSTRIAL DO CENTRO, LDA.



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TERMO DE RESPONSABILIDADE

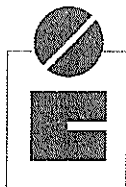
Luís Miguel Gonçalves Pedro, engenheiro técnico mecânico com o n.º 2178 de inscrição na Associação Nacional de Engenheiros Técnicos, residente na Urbanização Quinta da Fonte, Lote 22 – 6º B, freguesia de Santo António dos Olivais, concelho e distrito de Coimbra, declara, para os devidos efeitos determinados no regulamento de Equipamentos sob Pressão, ter considerado todos os Diplomas legais aplicáveis à operação de alteração em causa, nomeadamente o Decreto Lei n.º 90/2010, de 22 de Julho de 2010, e o Despacho n. 22332/2001, de 30 de Outubro de 2001, estando este projecto em absoluta conformidade com esses mesmos diplomas e que pela firma INDUCENTRO – EQUIPAMENTO E CONTROL INDUSTRIAL DO CENTRO, LDA., será efectuada a instalação, de acordo com o projecto em anexo de que é autor, do gerador de vapor com o número de registo 10881/C, da marca MORISA, a instalar na firma SUMOL+COMPAL MARCAS, S.A., contribuinte n.º 505042037, localizada na Zona Industrial da Formiga, 3100 – 517 Pombal, freguesia da Pombal, concelho da Pombal, distrito de Leira.

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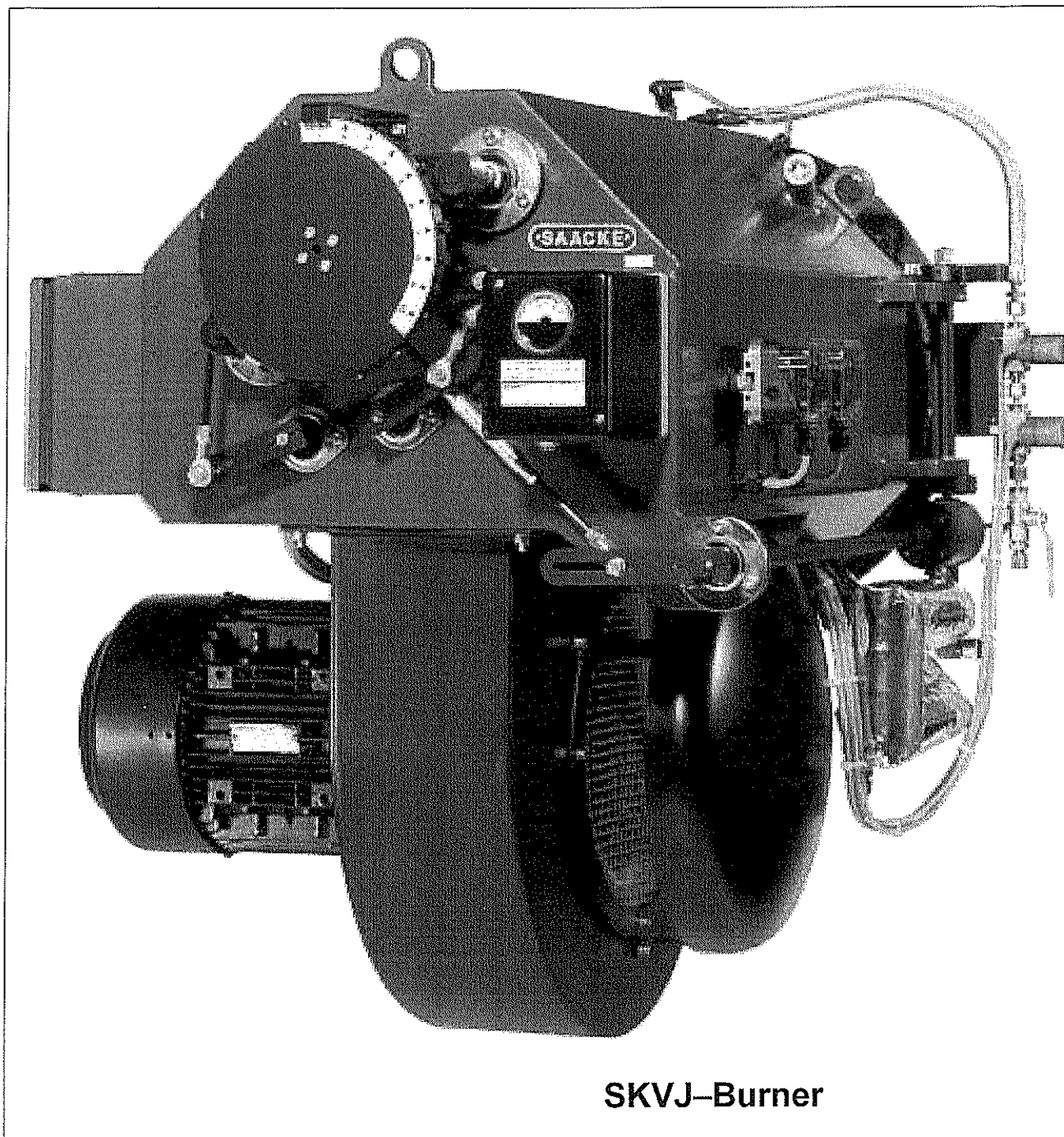
INDUSTRIAL CONTROL INDUSTRIAL DO CENTRO, LDA.



ANEXOS

- Catálogo e características técnicas do queimador.
- Planta topográfica de localização (escala 1:500).
- Desenhos de instalação: planta, alçados, cortes (escala 1:100).

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SKVJ-Burner

Technical Documentation

SAACKE



Applications

Steam-/hot water boiler as three-pass boiler and thermal oil boiler

Fuels: heavy fuel oil, natural gas,
propane und butane upon request

Design: monoblock burner

Burner operation data

Type SKVJ	Max. capacity Max. oil flow rate	Gas control range Min. low fire	Heavy fuel oil control range Min. low fire	Gas-side draft loss	Motor rating Rotary cup atomizer fan
10	1.13 MW 100 kg/h	inapplicable	1:3 30 kg/h	inapplicable	1.1 kW 2.2 kW
15	1.90 MW 170 kg/h	inapplicable	1:4 35 kg/h	inapplicable	1.1 kW 3.0 kW
25	2.80 MW 250 kg/h	inapplicable	1:5 40 kg/h	inapplicable	1.5 kW 5.5 kW
Type SKVJ, SKVJG	Max. capacity Max. oil flow rate	Gas control range Min. low fire	Heavy fuel oil control range Min. low fire	Gas-side draft loss	Motor rating Rotary cup atomizer fan
20	3.4 MW 300 kg/h	1:6 0.45 MW	1:5 40 kg/h	120 mbar	3.0 kW 5.5 kW
30	3.5 MW 310 kg/h	1:6 0.51 MW	1: 45 kg/h	120 mbar	3.0 kW 7.5 kW
40	5.0 MW 440 kg/h	1:7 0.68 MW	1:6 60 kg/h	120 mbar	4.0 kW 11.0 kW
50	6.1 MW 540 kg/h	1:7.5 0.68 MW	1:6.5 60 kg/h	120 mbar	4.0 kW 15.0 kW
55	6.6 MW 580 kg/h	1:8 0.68 MW	1:7 60 kg/h	120 mbar	4.0 kW 18.5 kW

Control system

The standard burner version is equipped with a mechanical fuel-air compound control system.

Information on refractory boiler lining

The brickwork of the boiler has to be realized in compliance with the Technical Documentation 1-2010-6002 / 02.

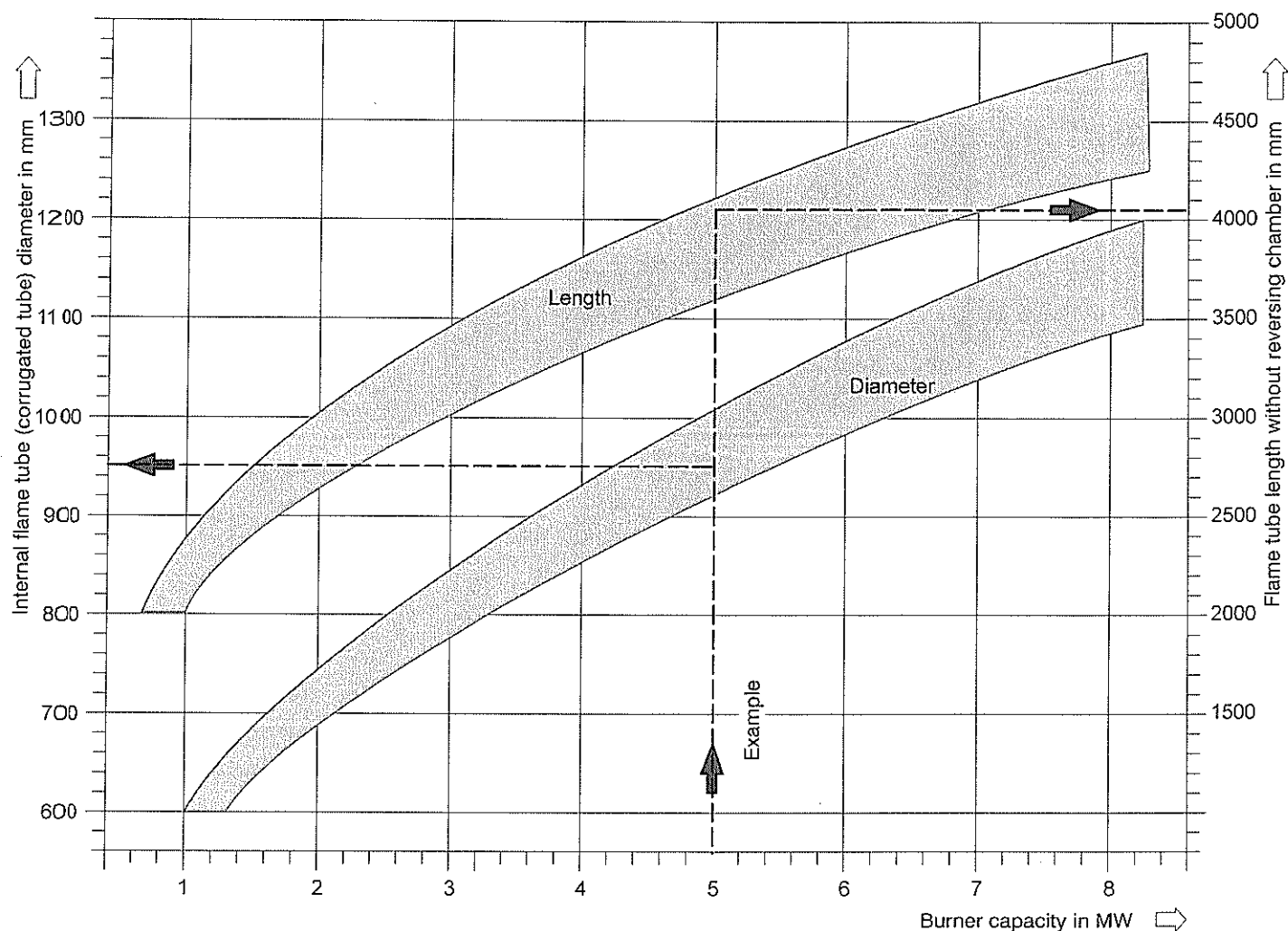


Furnace
Dimensions

Monoblock Rotary Cup Burner SKVJ 10...25

SKVJ/SKVJG 20...55 and JG/L 20...70

for the combustion of fuel oil or natural gas



Corrugated tube: min. internal flame tube diameter according to diagram

Plain tube: min. internal flame tube diameter according to diagram + 50 mm

Example

Boiler: 6 t/h
 Burner capacity 5.0 MW
 Internal flame tube diameter: 950 mm
 Flame tube length: 4100 mm
 The flame tube is sufficiently sized.

Hints:

In case of furnace dimensions that vary from those in the diagram, please contact SAACKE for advice

Should it be required to observe certain emission values, please also contact SAACKE.

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Technical Documentation

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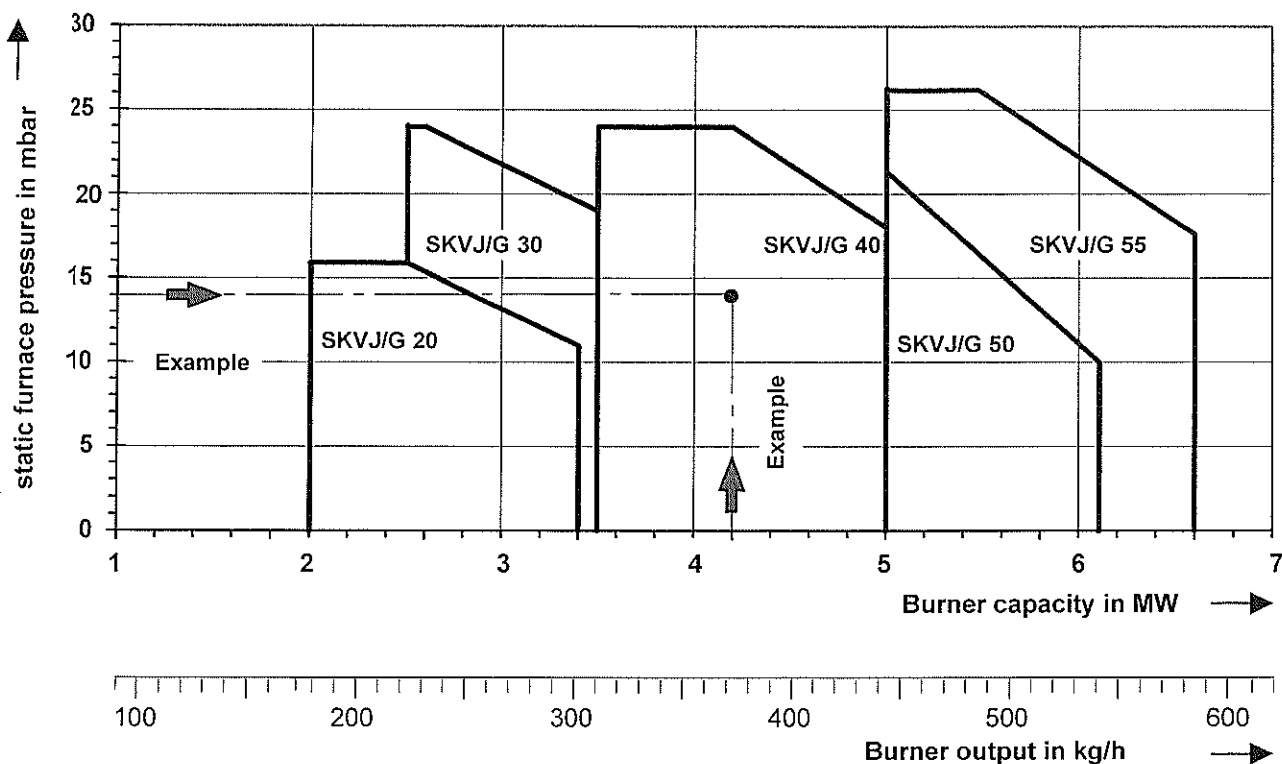
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**The selection diagrams are valid for:**

Line frequency 50 Hz

Air temperature max. 25°C

Height above sea level max. 250 m

Air density min. 1.15 kg/m³**Determination of the burner size:**

The capacity curve shows the admissible maximum burner capacity depending of the static furnace pressure.

The actual operating point (burner capacity and furnace pressure) must be within the range of the capacity curve.

Example:

Boiler 5 t/h

Burner capacity 4.2 MW

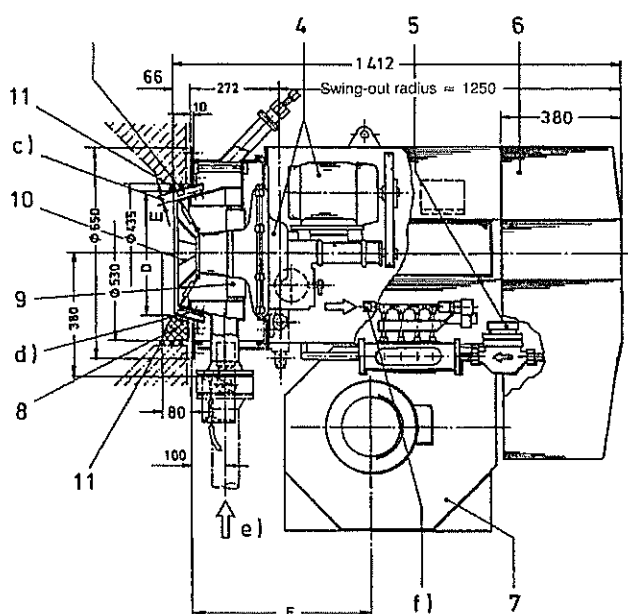
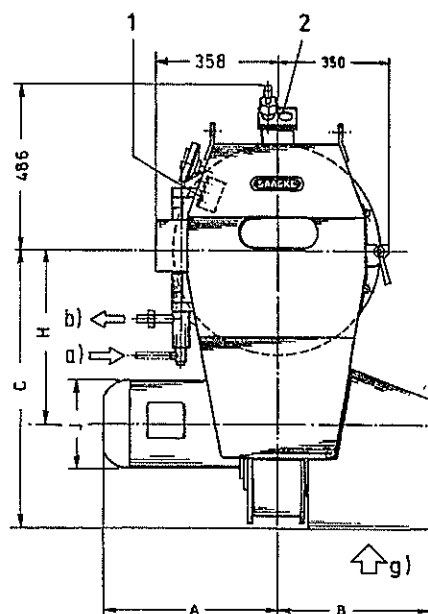
Furnace pressure 14 mbar

A burner of type/size SKVJ 40 is chosen.

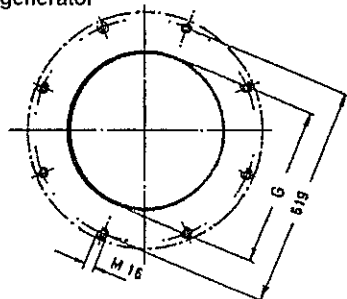


Monoblock Rotary Cup Burner SKVJG 20b...55b

for the combustion of fuel oil and fuel gas



Connection of the burner at the heat generator



- | | |
|---|-----------------------------------|
| 1 Ignition transformer | 10 Axial vane ring unit |
| 2 Connection for igniter and peephole | 11 Tightening (by others at site) |
| 3 Outer air annulus ring with vanes | |
| 4 Rotary cup atomizer unit | a) Fuel oil inlet DN 16 |
| 5 Volume flow meter for fuel oil | b) Fuel oil return DN 16 } |
| 6 Protective hood | c) Combustion air annulus |
| 7 Fan unit for combustion air | d) Fuel gas outlet holes |
| 8 Outer air annulus ring | e) Fuel gas inlet DN 80 **) |
| (against separate order only) | f) Water inlet R1/2 |
| 9 Ring body for tertiary air adjustment | g) Combustion air inlet |

*) Place the connection pipings so that they can not be damaged when the burner is swung-out!

**) Flange connection to DIN 2633

Fig. 1: Dimensions of the burner

Type SKVJG	Burner capacity 1) and fuel output						Drive motor rating in kW	
	Fuel oil		Fuel gas				Rotary cup atomizer	Combustion air fan
	maximum	minimum	max.	min.	max.	min.		
	in MW	in kg/h	in Mw	in kg/h	in MW	in MW		
20 b	3.4	300	0.56	50	3.4	0.56	3	5.5
30 b	3.5	310			3.5			7.5
40 b	5.0	440	0.70	62	5.0	0.70	4	11.0
50 b	6.1	540			6.1			15.0
55 b	6.6	580			6.6			18.5

1) in case of heavy fuel oil with a lower heat value LHV of 40.75 MJ/kg

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Dimensions in mm									Weight	
A	B	C	D	E	F	G		H	J	in kg ²⁾
507	551	795	Ø354	18,5	590	without item 8 440	without item 8 440	508	Ø266	500
500	544	856	Ø366		550			537		
612			Ø377	22					Ø320	
629			Ø387	27,5						

2) in addition 68 kgs for transport trestle

Motors:

- Supply voltage. 3 ~ 50 Hz 380 V
- Switching operation: 380 V Δ
- Control voltage: 1 ~ 50 Hz 220 V

Power input of control system ³⁾

with electric heating systems and without
liquid mixing unit assembly: 815 VA (operation) 1235 VA
(start)

uels:

all fuel oils to DIN 51 603,
city-, pipeline-, natural- and
liquid gas

3) For further values see 'Structural and Operational
Description'.

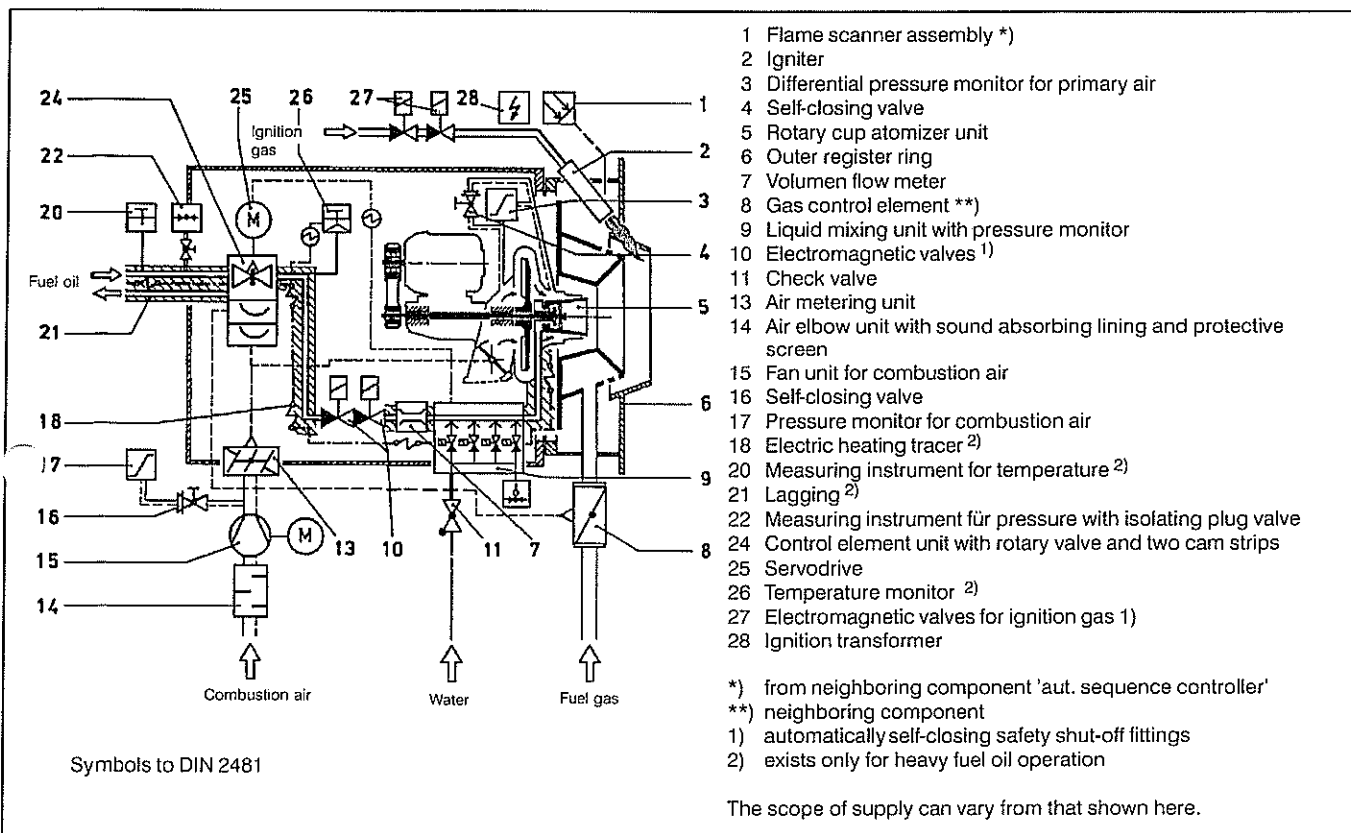


Fig. 2: Piping diagram

Monoblock Rotary Cup Burner SKVJ 20b...55b

for the combustion of fuel oil and fuel gas

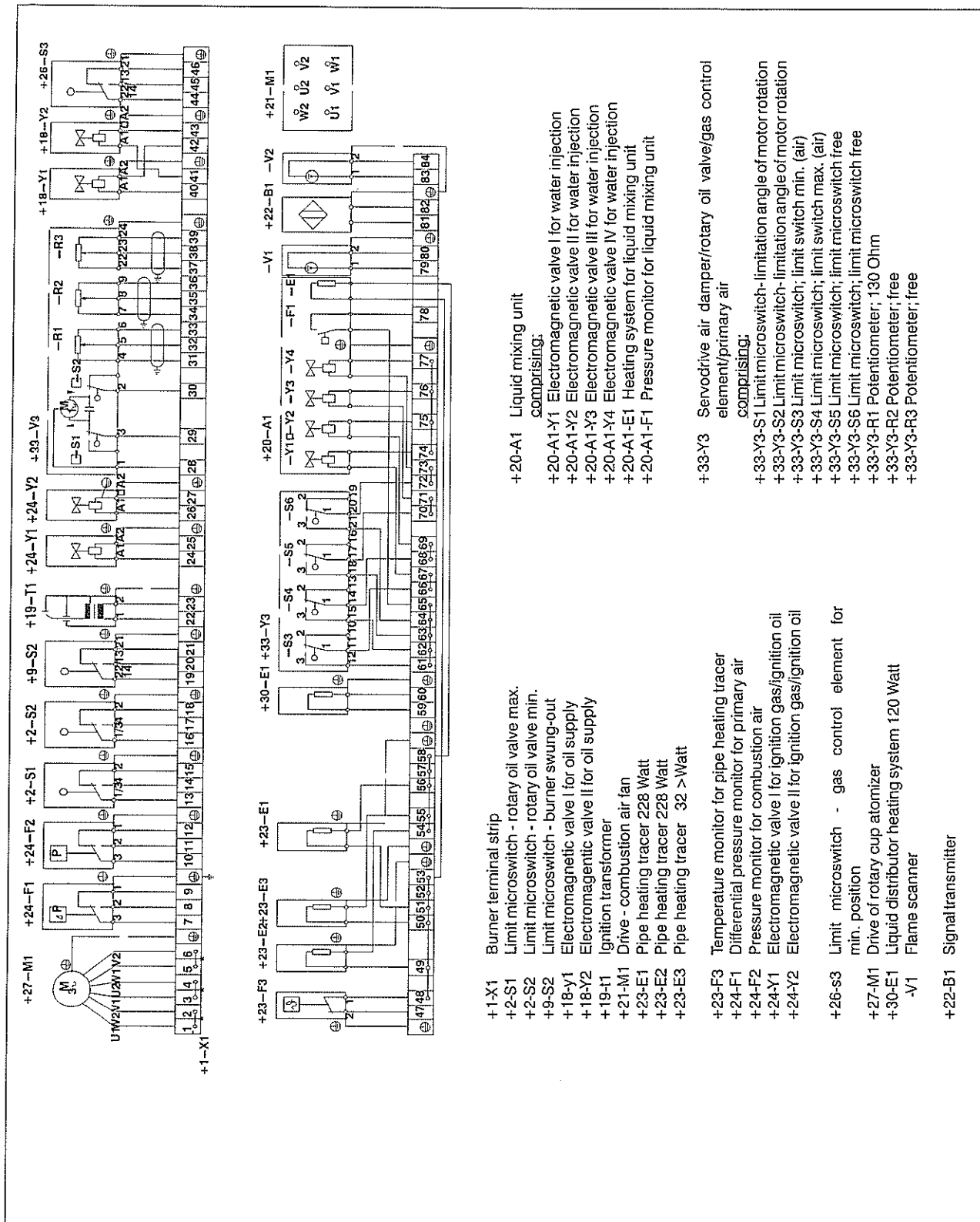


Fig. 3: Terminal wiring diagram

Technical Documentation



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Monoblock Rotary Cup Burner SKVJG 20...55 for the combustion of fuel oil and fuel gas

General description

The SAACKE monoblock rotary cup burner SKVJG is used for optional combustion of fuel oils to DIN 51603 or fuel gases to DIN 1340.

A type certification to DIN EN 676 and 298 has been effected.

For the change over from oil operation to gas operation or vice versa, it is only necessary to press the mode of operation selector switch.

When firing oil, this burner operates to the rotary atomizing principle and, when firing gas, to the 'mouth mixing principle' with the fuel gas and the combustion air being mixed in cross flow.

For oil operation, the fuel oil output is metered out by a rotary valve whereas a control damper adjusts the gas quantity for fuel gas operation. The combustion air volume flow required for oil or gas operation is supplied by a built-on fan unit and two control dampers limit the volume flow at the fan outlet. The fan sucks the combustion air via an air elbow unit that is lined with sound-absorbing material.

The control dampers for fuel gas and combustion air are connected with the rotary oil valve by means of rigid or flexible transmission elements and adjustable cam strips.

An electric servomotor that gets its signals from the load controller drives the rotary oil valve.

The fuel oil is released to the rotary atomizing cup by two electromagnetic valves that are designed as one unit (control element with double complete shut-off) and inspected as a safety system as per DIN 32 725.

For the determination of the fuel oil consumption, the burner is equipped with a volume flow meter.

The following burner designs can be delivered:

- left-hand or right-hand swing-out
- and
- counter-clockwise rotation (seen in direction of the flame).

For a reduction of the content of solids in the flue gas when firing fuel oil by means of water, the structural assemblies 'liquid mixing unit' and 'power transducer' can be arranged at the burner. The assembly 'supply unit' is required in addition for feeding the burner with water (see separate Structural and Operational Description).

The equipment for the

- fuel oil supply and preparation
- fuel gas supply
- fuel gas metering-out (butterfly damper) to the burner
- release of fuel gas to the burner
- control and monitoring

are no integral parts of this burner and must be chosen in compliance with the requirements of the firing plant.

Like a construction kit, the burner is composed of different structural assemblies.

The pertinent Data and Dimension Sheet should be taken as a supplement to this description.

Setting of volume flows of fuel oil, combustion air and primary air

The volume flows are limited as follows:

- fuel oil by a rotary valve with almost linear characteristic curve
- combustion air by two dampers
- primary air by one damper

The rotary valve operates to a scale with a division from 1 to 10. In position 1 (low fire) and 10 (maximum load) one positively disconnecting microswitch each closes its contacts. The rotary valve is connected with a control disk unit that comprises two individually adjustable cam strips. The cam strips are supported by several guide blocks and can be controlled over the complete setting range. Each cam strip guides a lever which has its fixed point at one end and at its other end is prepared for the connection of a linkage with the dampers for combustion air and a flexible control cable with the damper for fuel gas (description see below). The cam strips equalize the non-linear characteristic curve of the dampers.

The damper for primary air is connected with the damper for combustion air via a linkage.

By means of a lever and a linkage, an electric servomotor drives the rotary valve. The servomotor gets its commands from the load controller thus acting directly on the rotary valve. For the feedback of the motor position or rotary valve position a potentiometer - for example for a remote indication - and two microswitches are integrated in the servomotor.

Each modification of the rotary valve position between positions 1 and 10 results in a new damper position of the combustion air, the primary air and the fuel gas. A low fire spindle that is arranged in a bypass to the rotary valve for adjusting the minimum fuel oil volume flow.

Guiding and atomizing the fuel oil

The fuel oil is guided to the oil distributor assembly by a separately arranged fuel oil supply system via the sub-assemblies oil hinge, casing unit with rotary valve, control element unit with double complete shut-off, liquid mixing unit (if existing) and the volume flow meter.

The fuel oil then flows through the liquid distributor with a 'pre-distribution' into the rotary atomizing cup. Thanks to the effect of the centrifugal force of the rotary atomizing cup rotating with high speed, the fuel oil is evenly distributed on the inner wall of the cup and then - because of the conical shape of the cup - moves forward to the cup rim. The thin oil film thus produced is at first thrown off from the cup rim nearly radially and then split in fine fuel oil droplets through the effect of the primary air blown into the oil film at this point. At the same time, the oil droplets are directed axially in the requested atomizing angle.



In order to assure readiness for operation with heavy fuel oil, a temperature controller switches on the electric heating system of the control element unit with double complete shut-off, of the liquid mixing unit (if existing), of the volume flow meter and the piping as soon as the fuel oil temperature drops below a preset value. The electric heating system of the oil distributor must be switched so that it is in operation during the purge time only. When the rotary cup atomizer switches off after having reached the control point, warm heavy fuel oil flows through the casing unit with the rotary valve in order to keep them warm.

Shut-off or release of the fuel oil volume flow

The structural assembly 'control element unit with double complete shut-off' consists of two control elements with complete shut-off that are functionally completely independent from each other and have one servodrive and one control module each.

Direct current magnets with built-on amplifiers which are suitable for continuous operation are provided as servodrive.

The control modules are directly connected mechanically with the servodrives. Both control modules are placed in a common casing. The complete shut-off is assured by a compression spring each that presses a tappet on a gasket made of Viton.

The positions 'open' and 'closed' of each control module can be observed separately through a transparent hood. For heavy fuel oil operation only, a heater cartridge suitable for continuous operation is mounted in the casing of the control modules.

In compliance with the requirements established for a safety shut-off system, both close when deenergized.

Maintenance of the control elements is not required because the movable parts are always surrounded by the fuel and the servodrives are also maintenance-free.

The fitted dirt trap must be cleaned in regular intervals.

Feeding, guiding and monitoring the primary air

The motion of rotation produced by the drive motor is transmitted on a shaft running in antifriction bearings by means of Poly-V belts. The radial fan impeller arranged on the shaft and the rotary atomizing cup are so brought in a high rotating motion. The radial fan impeller feeds and compresses the air and conducts it to the cup shroud via the diffuser.

The primary air now emerges through the circular annulus that is formed by the outer diameter of the rotary atomizing cup and the inner diameter of the cup shroud.

A small portion of the primary air is guided to the fastening elements of the rotary atomizing cup for cooling purposes. The primary air quantity is abt. 5 % of the required combustion air.

The pressure rise caused by the primary air fan is monitored by a differential pressure monitor. With an electroma-

gnetic valve connected in parallel, the monitor can be checked for proper operation.

The structural assembly 'air metering unit' is a control element that consists of a casing and two dampers. The dampers are connected with each other by a linkage.

The dampers meter out the combustion air volume flow and distribute the combustion air uniformly into the assembly 'carrying and air guiding unit'.

The drive of the dampers is made by a lever that is guided in the cam strip of the control disk unit and a linkage (see description above).

The assembly 'carrying and air guiding unit' puts up all sub-assemblies of the monoblock rotary cup atomizer, guides the combustion air and makes it possible to swing-out the burner.

Control and guiding of the fuel gas volume flow and mixing it with combustion air

The fuel gas volume flow is adapted to the combustion air volume flow determined in fuel oil operation.

Via a damper (that is no integral part of the monoblock rotary cup atomizer), the fuel gas flows into the ring chamber from where it enters the combustion air annulus through gas nozzles. In this annulus the gas is mixed with the combustion air and then directed into the furnace via axially arranged vane blades.

The damper is driven by a flexible control cable (see description above).

A microswitch fitted at the damper acknowledges the low firing rate position.

Generating ignition voltage, releasing the ignition gas and igniting the burner

From the supply voltage the ignition transformer generates the high voltage that is required for the formation of ignition sparks in the igniter.

The high voltage line to the ignition electrode is firmly connected with the ignition transformer and equipped at its free end with a plug-type connection for the ignition electrode.

The essential components of the igniter are the igniter head, the stabilizing plate and the ignition electrode.

The ignition gas volume flow is controlled by means of a set screw.

A special air supplying equipment is not required.

The ignition gas is supplied through two electromagnetic valves to the igniter head where it emerges through several holes at the level of the ignition electrode behind the stabilizing plate in the combustion air annulus. The ignition gas is ignited by a high-voltage ignition spark that has been generated during the ignition time between the ignition electrode and the mass.

As soon as the ignition flame exists (supervised by the flame detector) and at the end of the pre-ignition time, the two safety shut-off valves open and the main flame is ignited.

Monoblock Rotary Cup Burner SKVJG 20...55

for the combustion of fuel oil and fuel gas

Remark

For cleaning and maintenance purposes, the monoblock rotary cup atomizer can be swung open without undoing the fuel oil and fuel gas pipings. Make sure that no devices, pipings, valves or fittings, etc. are installed in the burner swing-out range.

The protective hood made of alumina protects the valves and fittings and electric devices that are mounted directly at the rear burner wall from damages and can be swung-down for maintenance purposes.

For reasons of readiness for operation and functional safety,

the monoblock rotary cup burner and its safety shut-off equipment should be checked once a year. See also DIN 4755 Part 1, Section 6 and DN EN 267 and DIN EN 12953-7, Section 4.

During the operation with fuel gas, the motor of the rotary cup atomizer must not be energized.

In addition, an outer air annulus ring that consists of 4 sectors with refractory material can be delivered for the arrangement at the register of the burner at the furnace side.

Technical data

Burner capacity : see separate leaflet
Certification No. : see Factory Standard SN 0911

Fuel oil
- grade : all fuel oils to DIN 51 603
- kinematic viscosity : max. 45 cSt
- required fuel oil temperature : see Viscosity-Temperature Chart (max. 120 °C)

- Fuel oil pressure in supply line : min. 2.5 bar max. 5 bar

Fuel gas
- grade : all fuel gases to DIN 1340
- operating pressure : see separate leaflet

Enclosure type : IP 54 to DIN 40 050

Gas pressure for igniter : min. 50 mbar
Ambient- and combustion air temperature: max. 40 °C
Degree of radio-shielding : N to VDE 0875

3-phase a-c motors
- supply voltage : 3 ~ 50 Hz /60 Hz
- control voltage : 1 ~ 50/60 Hz 230V

Power input of control system	Start-up	Operation
- without heating and without liquid mixing unit	: 600 VA	180 VA
- with el. heating and without liquid mixing unit	: 1235 VA	815 VA
- with el. heating and with liquid mixing system	: 1485 VA	1105 VA

Maximum contact loading
- pressure monitor for primary air and combustion air : 3A
- limit switch for fuel oil metering : 6A
- limit switch for current interruption when swinging the rotary cup atomizer out : 5A
- limit switch for fuel gas metering : 5A

Electric servomotor
- running cycle between limit positions : 80 seconds
- position-depending potentiometers (2 off) : 0...130Ω
- Maximum contact loading : 2A

Control element unit with double complete shut-off
- nominal current each servodrive : 0.25A

Heating systems
(required for heavy fuel oil operation only)
- liquid distributor : 120W
- pipings with valves and fittings : 400W
- control element unit with double complete shut-off : 115W
- liquid mixing unit : 230W

Technical Documentation

SAACKE

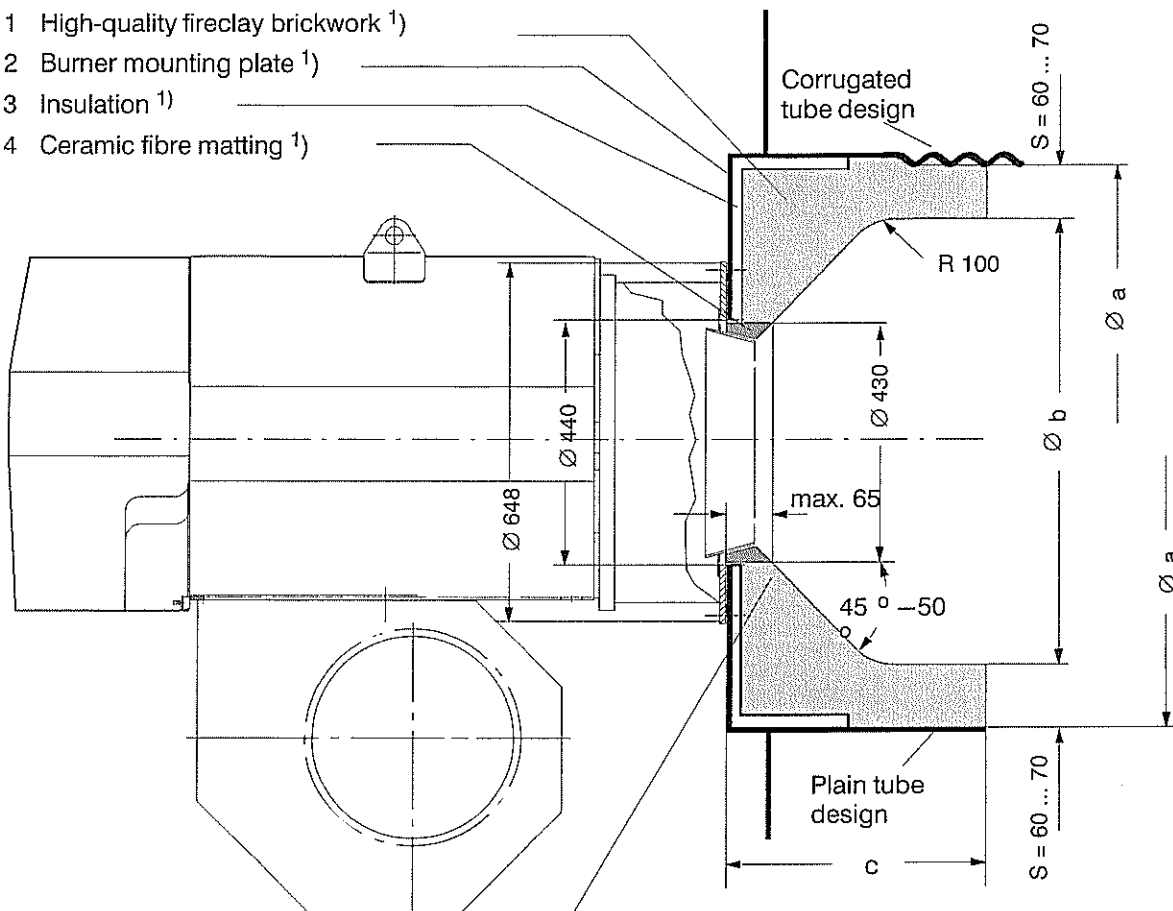
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- 1 High-quality fireclay brickwork ¹⁾
- 2 Burner mounting plate ¹⁾
- 3 Insulation ¹⁾
- 4 Ceramic fibre matting ¹⁾



The refractory material for the brickwork must have an alumina (Al_2O_3) content of at least 60 % and a spalling resistance of at least 15.

¹⁾ Items 1 thru 4 are no integral parts of the burner

Fig.: Refractory boiler lining for corrugated flame tube (shown above) and plain flame tube (shown below).

In general, the wall thickness S of the brickwork is 60...70 mm. For the internal diameter that means: $\varnothing b = \varnothing a - 120 \dots 140$ mm with a as internal flame tube diameter (shown as corrugated tube above and as plain tube below). Normally, the length c of the brickwork is half the flame tube diameter plus 50 mm, e.g. $c = 0.5a + 50$ mm.

Example:

Boiler capacity:	6 t/h
Burner capacity:	440 kg/h heavy fuel oil
Flame tube diameter:	1000 mm
Chosen:	$\varnothing b = 870$ mm
	$c = 550$ mm